

may be the same or different and m and n independently are 1, 2, 3 or 4, with the proviso that the bilateral symmetry is maintained; R" is a structural bridge between X and the (C₄R'_mC₅C₄R'_n) ring to impart stereorigidity; Q is a hydrocarbyl radical having 1-20 carbon atoms or is a halogen; Me is a Group IIIB, IVB, VB, or VIB metal as positioned in the Periodic Table of Elements; and Me can be in any of its theoretically possible oxidation states;

- b) introducing the catalyst into a polymerization reaction zone containing an olefin monomer and maintaining the reaction zone under polymerization reaction conditions to produce a syndiotactic atactic block polymer; and
- c) recovering said syndiotactic/atactic block polymer from said polymerization reaction zone.

15. (New) The process of claim 14, wherein the heteroatom ligand of said catalyst is selected from the group consisting of N, P, O and S.

16. (New) The process of claim 15, wherein Me is selected from the group consisting of Ti, Zr and Hf.

17. (New) The process of claim 16, wherein the R" is a silyl or hydrocarbyl biradical having at least one silicon or carbon atom to form the bridge.

18. (New) The process of claim 17, wherein R" is dimethylsilyl.

19. (New) The process of claim 14, wherein said monomer is propylene and said reaction zone is operated under polymerization conditions to produce a syndiotactic/atactic block polypropylene.

20. (New) The process of claim 15 wherein said syndiotactic/atactic block polypropylene, comprises alternating blocks of syndiotactic and atactic sequences in which the syndiotactic sequences are longer than the atactic sequences.

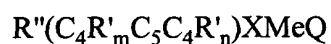
21. (New) The process of claim 20 wherein said syndiotactic/atactic block polypropylene, contains at least 70% syndiotactic triads.

22. (New) The process of claim 19 wherein said syndiotactic/atactic block polypropylene, is elastomeric.

23. (New) The process of claim 19 wherein said polymerization conditions include a first polymerization temperature and further comprising changing the polymerization temperature to a higher value to provide a syndiotactic/atactic block polypropylene having a decreased syndiotactic/atactic ratio relative to the syndiotactic/atactic ratio produced at said first lower polymerization temperature.

24. (New) The process of claim 19 wherein R" is a diphenyl silyl bridge and wherein said polymerization reaction zone is operated under conditions to produce a syndiotactic/atactic block, polypropylene, having a higher molecular weight than the molecular weight produced by a catalyst having a dimethylsilyl structural bridge.

25. (New) A syndiotactic/atactic block homopolymer of an α -olefin having at least 3 carbon atoms produced by polymerizing said α -olefin in the presence of a catalyst of the general formula:



wherein X is an hetero-atom ligand with one or two lone pair electrons selected from the elements of Group VA or VIA which can be substituted or non-substituted: $(C_4R'_mC_5C_4R'_n)$ is a symmetrically substituted, 3,6-substituted fluorenyl; R' is hydrogen or hydrocarbyl radical

having from 1-20 carbon atoms, a halogen, an alkoxy, an alkoxy alkyl or an alkylamino or alkylsilyl radical, each R' may be the same or different and m and n independently are 1, 2, 3 or 4, with the proviso that the bilateral symmetry is maintained; R" is a structural bridge between X and the (C₄R'_mC₅C₄R'_n) ring to impart stereorigidity; Q is a hydrocarbyl radical having 1-20 carbon atoms or is a halogen; Me is a Group IIIB, IVB, VB, or VIB metal as positioned in the Periodic Table of Elements; and Me can be in any of its theoretically possible oxidation states.

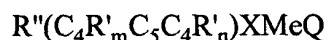
26. **(New)** The homopolymer of claim 25, wherein said α -olefin is propylene and said homopolymer is a syndiotactic/atactic block polypropylene.

27. **(New)** The homopolymer of claim 26 wherein said syndiotactic/atactic block polypropylene, comprises alternating blocks of syndiotactic and atactic sequences in which the syndiotactic sequences are longer than the atactic sequences.

28. **(New)** The homopolymer of claim 27 wherein said syndiotactic/atactic block polypropylene, contains at least 70% syndiotactic triads.

29. **(New)** The homopolymer of claim 28 wherein said syndiotactic/atactic block polypropylene, is elastomeric.

30. **(New)** A syndiotactic/atactic block copolymer of at least two α -olefin monomers produced by polymerizing said α -olefin monomers in the presence of a catalyst of the general formula:



wherein X is an hetero-atom ligand with one or two lone pair electrons selected from the elements of Group VA or VIA which can be substituted or non-substituted: (C₄R'_mC₅C₄R'_n) is a symmetrically substituted, 3,6-substituted fluorenyl; R' is hydrogen or hydrocarbyl radical having from 1-20 carbon atoms, a halogen, an alkoxy, an alkoxy alkyl or an alkylamino or

alkylsilyl radical, each R' may be the same or different and m and n independently are 1, 2, 3 or 4, with the proviso that the bilateral symmetry is maintained; R'' is a structural bridge between X and the (C₄R'_mC₅C₄R'_n) ring to impart stereorigidity; Q is a hydrocarbyl radical having 1-20 carbon atoms or is a halogen; Me is a Group IIIB, IVB, VB, or VIB metal as positioned in the Periodic Table of Elements; and Me can be in any of its theoretically possible oxidation states.

31. (New) The copolymer of claim 30 wherein one of said α -olefin monomers is propylene.